

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:

Feng Liang, et al.

Serial No.: Unassigned

Filed: Herewith

For: HYBRID PERMANENT MAGNET/SYNCHRONOUS
MACHINES

Attorney Docket No: 199-0792 (FGT 1605 PA)

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November 27, 2001
Date of Deposit

Angie Moscovitz


Signature

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to the examination of the above-identified divisional application, please enter the following amendment.

In The Specification:

Page 1, before the first line, add the following:

CROSS-REFERENCE TO RELATED APPLICATIONS

This is a divisional of United States Patent Application Serial No. 09/567,345 filed on May 9, 2000.

In The Claims:

Please withdraw claims 1-14.

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Please amend claim 17 to read as follows:

17. (Amended) The method according to claim 15, wherein the step of generating a permanent magnet flux comprises the step of generating a permanent magnet flux circulating from one of a first set of permanent magnets through a stator to one of a second set of permanent magnets, said permanent magnet flux continuing from said one of said second set of permanent magnets through one of a first set of poles, an inner rotor portion, and one of a second set of poles, thereby returning to said one of said first set of permanent magnets, wherein said permanent magnet flux in said first set of poles and said second set of poles and said inner rotor portion acts in opposition to a field current magnetic flux generated when a field coil is excited with current.

Please add new claims 19 and 20 to read as follows:

19. (New) A method of increasing rotor flux and power output in a generator of an automobile comprising:
- providing a rotor having an axis of rotation, said rotor comprising:
 - a first pole piece having a plurality of axially-extending first pole fingers and a first inner rotor portion;
 - a second pole piece having a plurality of axially-extending second pole fingers and a second inner rotor portion;
 - a field coil magnetically coupled with said first pole piece and said second pole piece which when energized

magnetizes said first pole fingers and said second pole fingers such that said first pole fingers have a north magnetic polarity and said second pole fingers have a south magnetic polarity;

a plurality of permanent magnets having a first set of permanent magnets and a second set of permanent magnets;

one of said first set of permanent magnets disposed between one of said plurality of first pole fingers and one of said plurality of second pole fingers, said one of said first set of permanent magnets having a first radially-inward surface, a first radially-outward surface, a first side surface and a second side surface, wherein said first side surface is adjacent to one of said plurality of first pole fingers and substantially extends the length of one of said plurality of first pole fingers, wherein said second surface is adjacent to one of said plurality of second pole fingers and substantially extends the length of one of said plurality of second pole fingers;

one of said second set of permanent magnets disposed between one of said plurality of first pole fingers and the other of said two adjacent said plurality of second pole fingers and having a second radially-inward surface, a second radially-outward surface, a third side surface and a fourth side surface, wherein said third side surface is adjacent to said first pole finger and substantially extends the length of said first pole finger, wherein said fourth side surface is adjacent to said other of said two adjacent said plurality of second pole fingers and substantially extends the length of said other of said two adjacent said plurality of second pole fingers;

wherein said first radially-outward surface and said first side surface have a north magnetic polarity and wherein said second radially-outward surface and said fourth side surface have a south magnetic polarity; and

generating a permanent magnet flux circulating from one of a first set of permanent magnets through a stator to one of a second set of permanent magnets, said permanent magnet flux continuing from said one of said second set of permanent magnets through one of a first set of poles, an inner rotor portion, and one of a second set of poles, thereby returning to said one of said first set of permanent magnets, wherein said permanent magnet flux said first set of poles and said second set of poles and said inner rotor portion acts in opposition to a field current magnetic flux generated when a field coil is excited with current.

20. (New) A method of increasing rotor flux and power output in a generator of an automobile comprising:

providing a rotor having an axis of rotation, said rotor comprising:

a plurality of axially-extending pole pieces having an inner rotor portion;

a plurality of rotor coils, one of said plurality of rotor coils magnetically coupled with one of said plurality of axially-extending pole pieces which when energized magnetizes said one of said plurality of axially-extending pole pieces such that each adjacent one of said plurality of axially-extending pole piece has an opposite magnetic

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polarity;

a plurality of permanent magnets having a first set of permanent magnets and a second set of permanent magnets;

one of said first set of permanent magnets disposed between a first adjacent pair of said plurality of axially-extending pole pieces and having a first radially-inward surface, a first radially-outward surface, a first side surface and a second side surface, wherein said first side surface is adjacent to one of said first adjacent pair of pole pieces and extends the length of one of said first adjacent pair of pole pieces, wherein said second surface is adjacent to the other of said first adjacent pair of pole pieces and extends the length of other of said first adjacent pair of pole pieces;

one of said second set of permanent magnets disposed between a second adjacent pair of said plurality of axially-extending pole pieces and having a second radially-inward surface, a second radially-outward surface, a third side surface and a fourth side surface, wherein said third side surface is adjacent to one of said second adjacent pair of axially-extending pole pieces and extends the length of one of said second adjacent pair of axially-extending pole pieces, wherein said fourth surface is adjacent to the other of said second adjacent pair of axially-extending pole pieces and extends the length of said other of said second adjacent pair of axially-extending pieces;

wherein said other of said first adjacent pair of said plurality of axially-extending pole pieces and said other of said second adjacent pair of said plurality of axially-

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extending pole pieces have the same magnetic polarity;

wherein said first radially-outward surface and said first side surface have a north magnetic polarity and wherein said second radially-outward surface and said fourth side surface have a south magnetic polarity; and

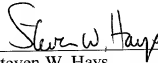
generating a permanent magnet flux circulating from one of a first set of permanent magnets through a stator to one of a second set of permanent magnets, said permanent magnet flux continuing from said one of said second set of permanent magnets through one of a first set of poles, an inner rotor portion, and one of a second set of poles, thereby returning to said one of said first set of permanent magnets, wherein said permanent magnet flux in said first set of poles and said second set of poles and said inner portion acts in opposition to a field current magnetic flux generated when a rotor coil is excited with current.

REMARKS

This Preliminary Amendment is being filed together with a divisional application. Claims 15-18, currently pending in the present application, are being retained with claims 1-14 being canceled and new claims 19 and 20 being added. Thus, claims 15-20 remain in the divisional application for examination.

Respectfully submitted,

ARTZ & ARTZ, P.C.



Steven W. Hays
Registration No. 41,823
28333 Telegraph Road, Ste. 250
Southfield, MI 48034
(248) 223-9500

Date: November 27, 2001

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"VERSION WITH MARKINGS TO SHOW CHANGES MADE"

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In The Claims:

Please withdraw claims 1-14.

Please amend claim 17 to read as follows:

17. (Amended) The method according to claim 15, wherein the step of generating a permanent magnet flux comprises the step of generating a permanent magnet flux circulating from one of a first set of permanent magnets through a stator to one of a second set of permanent magnets, said permanent magnet flux continuing from said one of said second set of permanent magnets through one of a first set of poles, an inner rotor portion, and one of a second set of poles, thereby returning to said one of said first set of permanent magnets, wherein said permanent magnet flux in said first set of poles and said second set of poles and said inner rotor portion acts in opposition to a field current magnetic flux generated when a field coil is excited with current.

Please add new claims 19 and 20 as follows:

19. (New) A method of increasing rotor flux and power output in a generator of an automobile comprising: providing a rotor having an axis of rotation, said rotor comprising:

a first pole piece having a plurality of axially-extending first pole fingers and a first inner rotor portion;

a second pole piece having a plurality of axially-extending second pole fingers and a second inner rotor portion;

a field coil magnetically coupled with said first pole piece and said second pole piece which when energized magnetizes said first pole fingers and said second pole fingers such that said first pole fingers have a north magnetic polarity and said second pole fingers have a south magnetic polarity;

a plurality of permanent magnets having a first set of permanent magnets and a second set of permanent magnets;

one of said first set of permanent magnets disposed between one of said plurality of first pole fingers and one of said plurality of second pole fingers, said one of said first set of permanent magnets having a first radially-inward surface, a first radially-outward surface, a first side surface and a second side surface, wherein said first side surface is adjacent to one of said plurality of first pole

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fingers and substantially extends the length of one of said plurality of first pole fingers, wherein said second surface is adjacent to one of said plurality of second pole fingers and substantially extends the length of one of said plurality of second pole fingers;

one of said second set of permanent magnets disposed between one of said plurality of first pole fingers and the other of said two adjacent said plurality of second pole fingers and having a second radially-inward surface, a second radially-outward surface, a third side surface and a fourth side surface, wherein said third side surface is adjacent to said first pole finger and substantially extends the length of said first pole finger, wherein said fourth side surface is adjacent to said other of said two adjacent said plurality of second pole fingers and substantially extends the length of said other of said two adjacent said plurality of second pole fingers;

wherein said first radially-outward surface and said first side surface have a north magnetic polarity and wherein said second radially-outward surface and said fourth side surface have a south magnetic polarity; and

generating a permanent magnet flux circulating from one of a first set of permanent magnets through a stator to one of a second set of permanent magnets, said permanent magnet flux continuing from said one of said second set of permanent magnets through one of a first set of poles, an inner rotor portion, and one of a second set of poles, thereby returning to said one of said first set of

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permanent magnets, wherein said permanent magnet flux said first set of poles and said second set of poles and said inner rotor portion acts in opposition to a field current magnetic flux generated when a field coil is excited with current.

20. (New) A method of increasing rotor flux and power output in a generator of an automobile comprising: providing a rotor having an axis of rotation, said rotor comprising:

a plurality of axially-extending pole pieces having an inner rotor portion;

a plurality of rotor coils, one of said plurality of rotor coils magnetically coupled with one of said plurality of axially-extending pole pieces which when energized magnetizes said one of said plurality of axially-extending pole pieces such that each adjacent one of said plurality of axially-extending pole piece has an opposite magnetic polarity;

a plurality of permanent magnets having a first set of permanent magnets and a second set of permanent magnets;

one of said first set of permanent magnets disposed between a first adjacent pair of said plurality of axially-extending pole pieces and having a first radially-inward surface, a first radially-outward surface, a first side surface and a second side surface, wherein said first side surface is adjacent to one of said first adjacent pair of pole

stator to one of a second set of permanent magnets, said permanent magnet flux continuing from said one of said second set of permanent magnets through one of a first set of poles, an inner rotor portion, and one of a second set of poles, thereby returning to said one of said first set of permanent magnets, wherein said permanent magnet flux in said first set of poles and said second set of poles and said inner portion acts in opposition to a field current magnetic flux generated when a rotor coil is excited with current.

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